

Example #4: A force of 100 N is applied on a 50 kg cart that is moving with a speed of 6.0 m/s and has a force of friction of 20. N acting on it. At the end of 10. seconds, the cart is going 22 m/s.

a) How much work was done against inertia?

b) How much work was done in total?

$$\begin{aligned} a) \quad W &= \Delta E_k = \frac{1}{2} m v_f^2 - \frac{1}{2} m v_i^2 \\ &= \frac{1}{2} (50) [22^2 - 6^2] \end{aligned}$$

$$\boxed{W = 1.1 \times 10^4 \text{ J}} \quad (11200 \text{ J})$$

b) \rightarrow find distance travelled:

$$d = v_{av} t = \left[\frac{22+6}{2} \right] (10)$$

$$d = 140 \text{ m}$$

$$\rightarrow W = F_f d = 20(140) = 2800 \text{ J}$$

$$\rightarrow W_{\text{total}} = 11200 + 2800$$

$$\boxed{W_{\text{total}} = 1.4 \times 10^4 \text{ J}}$$